ERIC Document Resume	See Instruction Sheet	DATE OF RESUME	DATE RECEIVED

A. PUBLICATION DATA

1. ERIC NUMBER	2. ORIGINATOR CONTROL NO(S).	3. IDENTIFICATION NO.
ED002425	N.A.	N.A.

DO NOT WRITE IN SPACE BELOW

4. AUTHOR(S): Leonard, Joseph and Ciciarelli, Victor

5. TITLE OF DOCUMENT ABSTRACTED: S.M.P. Sequential Mathematics Program

6. PUBLICATION TITLE: N.A.

7. EDITOR(S): N.A.

8. PLACE OF ORIGIN: Madison Junior High
ORG. School
ST. Syracuse, New York
CITY, STATE

9. PUBLISHER OR SOURCE: Madison Junior High School
Syracuse, New York

10. VOL.	11. PAGES	12. MO./YR.	13. TOTAL PP.
N.A.	N.A.	9/64	21

TELE. EXT.
INST/LOC CODE

MICROFILM COPY AVAILABLE: YES ☒ NO ☐

COPYRIGHT GRANTED: YES ☐ NO ☒

COPYRIGHT RELEASE FILED: YES ☐ NO ☐

TYPE OF REPORT: PROPOSAL ☐ IN-PROGRESS ☐ FINAL ☒ FOLLOW-UP ☐

OTHER ERIC REFERENCES:

ERIC SATELLITE CODE

B. INDEXING DATA

14. SUBJECT AREA

15. TYPE OF ENDEAVOR: Curriculum Guide

16. INDEXING TERMS (6-12)

junior high school	number system	comparisons	algebra	
mathematics	decimal fractions	geometry	statistics	
sequential program	common fractions	measurement	set theory	
	basic operations	percents	diagnostic test	

17. ABSTRACT (MAX. 250 WORDS)

A sequential mathematics program beginning with the basic fundamentals or the fourth grade level is presented. Included are an understanding of our number system, and the basic operations of working with whole numbers -- addition, subtraction, multiplication, and division.

Common fractions are taught in the fifth, sixth, and seventh grades. A fraction is defined as a part of a whole object or group. A graphic illustration and a number line are used. Equivalent and regrouping fractions are taught as well as the basic operations. The use of comparisons, ratios,and proportions are taught in the seventh grade, and percents and decimal fractions in the sixth and seventh. Problem solving and geometry are covered in the seventh grade. Units of measurement and operations are taught in the fifth through the seventh grades. Algebraic symbols are introduced in the eighth grade; and simple equations, equations involving two or more operations to reach a solution, directed numbers, and graphing are studied. The ninth grade includes the language of statistics, an insurance unit using percentages and statistics, and an introduction to set theory.

A diagnostic test in mathematics, constructed in anticipation of an upgraded situation in the seventh grade, is included. The primary purpose is to locate the appropriate achievement levels of the sequential math program on which a child is operating.

ERIC No.

18. SOURCE OF ABSTRACT

C. FUNDING DATA

19. SUPPORTING ORGANIZATION	20. DIVISION OR DEPT.	21. CONTRACT NO. / PROJECT NO.
	22. TOTAL COST OF PROJECT	
	23. DURATION OF PROJECT	U.S. Department of Health, Education, and Welfare Office of Education

ERIC Form 1

000711

bk: Curriculum

Please Return To:
CLEARINGHOUSE
CENTER FOR RESEARCH AND DEVELOPMENT
ON EDUCATIONAL DIFFERENCES
HARVARD GRADUATE SCHOOL OF EDUCATION
CAMBRIDGE, MASSACHUSETTS 02138

ED002425

S. M. P.

SEQUENTIAL MATHEMATICS PROGRAM

Madison Junior High School

Joseph Leonard

Victor Cicciarelli

U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
Office of Education

This document has been reproduced exactly as received from the person or organization originating it. Points of view or opinions stated do not necessarily represent official Office of Education position or policy.

Mr. Joseph Bongo
Principal
Madison Junior High School

September 1964

ED002425

THESE OUTLINES ARE ONLY EXPERIMENTAL.

WE BELIEVE THAT THIS PROCESS MAY ASSIST IN DEVELOPING AND STRENGTHENING THE SKILLS OF THIS SUBJECT.

IT WILL BE NECESSARY IN THE FUTURE TO MAKE CHANGES, ADDITIONS OR DELETIONS TO THIS PROCESS.

SEQUENTIAL MATHEMATICS PROGRAM

GRADE LEVEL	TOPIC	PAGE
4	1. Understanding of Our Number System	1
4-5	2. Working with whole numbers	1
5-7	3. Common Fractions	2-3
7	4. Using Comparisons - Ratio and Proportions	3-4
6-7	5. Decimal Fractions	4-5
7	6. Percent and It's Use	5
7	7. Percent at Work - Interest - Discounts	5
7	8. Problem Solving in Installment Buying	6
7	9. Geometry at Work	6
5-7	10. Measurement	6-7
8	11. Using Algebraic Symbols	7
8	12. Algebra at Work -- simple equations	7
8	13. Equations Involving two or more Operations to Reach a Solution.	7
8	14. Directed Numbers - signed numbers	7
8	15. Graphing	8
9	16. Language of Statistics	8
9	17. Insurance Unit Using Percents and Statistics	8
9	18. Introduction to Set Theory	

SECTION II - MATHEMATICS DIAGNOSTIC TEST

Sequential Mathematics Program

Grade Level

A. BASIC FUNDAMENTALS OF MATHEMATICS

1. Understanding of Our Number System

a. Basic Hindu-Arabic symbols, 1-9 and 0

b. Place Value - Using a chart centered about the decimal point and also a number line to show how the relative size of a number is affected by the place value.

c. Reading and writing numerals - To learn that different forms can represent the same number. Here a teacher may differentiate between a number and a numeral.

d. Rounding off of numbers - Reason: efficiency.

(1) Use a number line to show whether it is closest to the higher or lower number.

(2) The Rule - five or greater add one; less than five leave the same.

2. Working with whole numbers - basic operations

a. Addition and subtraction

(1) Use a chart for slow learners

(2) Vertical and horizontal problems

b, Multiplication and division IMPASSABLE STEP

(1) Use of a chart or table

(2) Special help for any student having difficulty.

Emphasize the different ways of writing a problem

i.e. Division $\frac{30}{15}$ $15\overline{)30}$ $30 \div 15$

Multiplication 7×5 $\begin{array}{r} 7 \\ \times\ 5 \\ \hline \end{array}$

(3) Start with one and two digit problems and then work into higher number problems

5-6-7 3. Common Fractions

a. Definition of a fraction: Describes a part of a whole object or group.

$\frac{2}{5}$ top number is what we are talking about
bottom number is the total number of equal parts in the whole object or group.

b. Graphic illustration

(1) Make a fraction to describe the shaded part of the picture.

(2) Given a group of 21 kids, 7 are girls. Make a fraction to compare the girls with the whole group.

c. Number line - first between zero and one then fill in between the other whole numbers.

d. Equivalent fractions - Develop using a number line to show equivalent fractions are at the same points.

(1) Reducing - want the smallest terms

(2) Raising to higher terms - use an equation with a missing term either in the denominator or numerator.

example: $\frac{3}{5} = \frac{}{20}$ $\frac{9}{11} = \frac{27}{}$

e. Re-grouping fractions

(1) Improper fractions into whole or mixed numbers.

example: $\frac{11}{2} = 5\frac{1}{2}$

First develop the question of how many groups of two there are in eleven. Then the technique of dividing the bottom into the top.

(2) Expressing mixed numbers as improper fractions.

(3) Supplying the missing term for mixed numbers

examples: $5\frac{1}{2} = 4\frac{3}{2} = 1\frac{9}{2}$

f. Basic operations

(1) Addition and subtraction

(a) Proper fractions with the same denominators

(b) Proper fractions with different denominators. Special emphasis on techniques for finding lowest common denominator.

(c) Mixed numbers - Important point here is subtraction with borrowing.

(2) Multiplication and division

(a) Proper fractions - use different forms of presenting the problems.

Traditional: $\frac{4}{6} \times \frac{5}{9}$ $\frac{3}{8} \div \frac{3}{5}$

But for division a carry over from whole numbers would lead into division of decimals. $\frac{\frac{4}{5}}{\frac{7}{9}}$

Improper - minimum emphasis on this point importance of multiplication and division of fractions is questionable.

4. Using comparisons - Ratio and proportions

a. What is a comparison?...ratio? Why would we use a ratio?

7 Start with every day examples.

b. Writing ratios - Problem is to teach understanding of a ratio in a sentence form and how to change it to a computable problem.

(1) Start with graphic problems comparing one picture to another.

(2) In a sentence the wording places the numbers on the top or the bottom.

c. Meaning of a proportion: an equation

d. Solving proportions

(1) Simple proportions that can be solved by equivalent fractions.

example: $\frac{2}{3} = \frac{\quad}{9}$

(2) Proportions of greater difficulty solved by cross multiplication. (Product of the means and extremes)

example: $\frac{4}{6} = \frac{10}{\quad}$ $\quad 4x = 6 \times 10 \quad = \frac{60}{4} = 15$

5. Decimal Fractions

6-7 a. Meaning - refining the place value number line.

(1) Show relationship to common fractions on the same number, and how to compare different decimals.

(2) Extend the place value chart.

b. Expressing the decimal

(1) As common fractions

(2) In words

(3) From words to decimals

(4) From fractions to decimals

c. Addition and subtraction

(1) Lining up the decimal points - why?

(2) Borrowing

d. Multiplication and division

(1) Using powers of ten to move the decimal point in a division problem. $\frac{.08}{1.6} \times \frac{10}{10} = \frac{.8}{16.}$

(2) Fractional representation to understand location of decimal point in multiplication.

example: $.4 \times .2 = .08$ written $\frac{4}{10} \times \frac{2}{10} = \frac{8}{100}$.

(3) Introduction of the tricks for locating the decimal point in both kinds of problems.

e. Rounding off decimals

f. Comparison as to size with a number line.

6. Percent and it's use

a. Using hundredths as a common denominator. A way of comparing unlike things.

7

b. Changing the forms of percents

(1) Fraction to a percent

(A) Make hundredths in the denominator

example: $\frac{5}{100} = .05 = 5\%$ so if have $\frac{3}{20} \times \frac{5}{5} = \frac{15}{100}$

(b) Divide the denominator into the numerator.

(2) Changing a percent into a decimal.

(3) Changing a decimal into a percent by moving point.

(4) Percent into a fraction by putting it in terms of hundredths and reducing.

c. Use of percent in business

(1) Finding percents of numbers - 3% of 200 = ?
Emphasize 100% is the whole number - therefore, small than 100% will be less and greater than 100% will be more than the original number. Want the child to hav. an idea of the answer before he computes it.

(2) Finding what percent one number is of another. Base is again 100%. First discuss relative size, then approximate the percent. Is it larger or smaller than 100% ?

(3) Finding the base - example: 5 is 10% of what number?

7. Percent at Work - Interest - Discounts

a. What is percent? Compare to rent on a house or car.

b. Simple Interest - use formula

c. Promissory notes

7 8. Problem Solving in Installment Buying

a. Analyze the problem

(1) Selection of proper operation

(2) Calculation

(3) Conclusion

(4) Check for sensible answer

b. Advantages and disadvantages of installment buying - through class discussion.

9. Geometry at Work

7 a. Reproducing figures - Copy form example to get a feeling for geometric shapes.

b. Drawing figures from instructions to learn names of shapes and be able to group by kind - involves use of the rules

c. Inscribing a hexagon in a circle - Activity

d. Introduction to angles

(1) Names of angles - acute, obtuse, right angle.

(2) Concept of degrees - circle.

(3) Measuring the angle with a protractor and making an angle from given instructions.

e. Constructions

(1) Use of straight edge and compass.

(2) Bisecting lines.

(3) Constructing angles.

(4) Bisecting angles.

(5) Constructing perpendiculars.

5-27 10. Measurement

a. Introduction to units of measure: In., Sq., In., Lb., c

b. Units of measurement used by the industrial or scientif fields not familiar to the average person. Metric syst

5-7

c. Re-grouping measurements and finding equivalence. 7
examples: 6 lb. 12 oz. = 6 3/4 lb.; 3 ft. = 36"

d. Rounding measurements

e. Operations related to fractions; add, subtract, multiply and divide.

f. Formulas of perimeter and area for different geometric shapes that have already been introduced.

(1) Perimeter and area taught simultaneously.

(2) Circle

(3) Volume

(4) These formulas in word problems.

UPPER END OF LADDER

11. Using algebraic symbols

8 a. Evaluation of algebraic expressions

b. Writing algebraic expressions

c. Writing algebraic statements (equations)

12. Algebra at Work - simple equations

a. Solving of equations with one operation

8 b. Reading and writing equations with one operation

13. Equations involving two or more operations to reach a

8 solution.

a. Techniques for solving problems

b. Reading and writing equations and transferring from an English sentence to a mathematical sentence.

14. Directed numbers (signed numbers)

a. Four basic operations using number line and an array,

8 b. Relating signed numbers to operations and equations.

c. Coordinate system.

UPPER END OF LADDER - continued

8 15. Graphing - Reading and making bar graphs, circle graphs and line graphs.

16. Language of statistics

9 a. Meaning and use of statistics.

b. Terms: Central tendency, mean, mode, median and range.

c. Obtaining and recording information - tables and charts

d. Making a frequency distribution.

9 17. Insurance unit using percents and statistics.

18. Introduction to set theory

9 a. Why use sets:

b. Terms in set theory

c. Two new operations: Union and Intersection

d. Drawing a Venn Diagram to represent a set problem.

DIAGNOSTIC TEST IN MATHEMATICS

For grades Seven and Eight in
an Urban Environment.

Victor Ciciarelli
Joseph Leonard

Assisted by Interns:

Charles Rathbone
Stan Litz

This test is in anticipation of an ungraded situation in the seventh grade and the need for grouping by achievement in the eighth. By administering the test at the beginning and end of the school year, two functions are accomplished: one, the grouping on achievement levels; and second, a measure of achievement.

The primary purpose of the test is to locate the appropriate achievement levels on the rung of our Sequential Math Program on which a child is operating. An analysis of the total distribution will provide a basis for groupings on the various levels.

The areas of diagnosis are basic arithmetic skills and understanding of number concepts. A section of word problems tests reading and logical thinking.

A second use of the test as a progress indicator will give a fair measure of a child's development in concepts and basic skills.

For a more valid test, it should be given in four parts. Preferably on four successive days. This will alleviate any pressure or weariness on the students.

NAME_____

PERIOD_____

DATE_____

MATHEMATICS DIAGNOSTIC - Part I

Addition of Whole Numbers

1. 253 + 146

2. 965 + 375

3. 703 + 809 + 608

4. 897 + 469 + 856 + 988 + 835

5. 518 + 322 + 7 =

Subtraction of Whole Numbers

6. 857 - 342

7. 862 - 395

8. 8032 - 2347

9. 9000 - 3647

10. 843 take away 144 =

Multiplication of Whole Numbers

11. 304 x 2

12. 837 x 9

13. 27 x 60

14. 429 x 308

15. 257 x 26 =

Division of Whole Numbers

16. $2\overline{)804}$

17. $7\overline{)175}$

18. $6\overline{)365}$

19. $20\overline{)176}$

20. 3922 ÷ 53 =

21. Draw a Square

22. Draw a Triangle

23. Draw a Rectangle

24. Draw a Circle

Addition of Fractions

25. 3 3/8 + 1 1/8

26. 6 3/4 + 5 3/4

27. 7 1/2 + 2 3/4

28. 8 3/4 + 5 4/5

NAME_____

DIAGNOSTIC TEST I - cont'd PERIOD_____

DATE_____

Subtraction of Fractions

29. $3\ 3/4 - 1\ 1/4$ 30. $5 - 2\ 5/6$ 31. $4\ 3/8 - 2\ 7/8$ 32. $7\ 1/2 - 4\ 2/3$

Multiplication of Fractions

33. $3 \times 3/4 =$ 34. $\frac{1}{8} \times 4/5 =$ 35. $3\ 3/4 \times 4 =$ 36. $42\frac{1}{8} \times 7$

37. $32 \times 4\frac{1}{2}$

Division of Fractions

38. $4 \div 3/4 =$ 39. $6 \div 1\ 1/3 =$ 40. $2\frac{1}{8} \div 3\ 3/4 =$

41. $3/4 \div 2 =$

Addition and Subtraction of Decimals

42. $1.86 + 279.43 + .04 =$ 43. $2.2 + 18.63 + .008 =$

44. $37.56 - 1.48 =$ 45. $49.6 - 38.84 =$

Multiplication of Decimals

46. 12.7×4 47. $52 \times .08$ 48. $.43 \times .2$ 49. $2.8 \times 80 =$

Division of Decimals

50. $3\overline{)4.59}$ 51. $.2\overline{).186}$ 52. $1.2\overline{)27}$

NAME_____

PERIOD_____

DATE_____

MATHEMATICS DIAGNOSTIC - Part II

Reading and Writing Numbers

Write these numbers:

53. 97_____

54. 423_____

55. 8,970_____

56. 200,000 _____

57. 4,004_____

58. Twenty-six _____

59. Six hundred ten _____

60. Three thousand one hundred forty-two_____

61. Nine hundred thousand _____

62. Seven thousand fifty _____

Place Value

63. 13 = ___tens + ____ones

64. 648 = ____hundreds + ____tens + ____ ones

65. 1035 = _____thousands + ____hundreds + ____tens + ____ones

66. 973 = __8__hundreds + ____tens + __3__ones

67. 67 = __5__tens + ____ones

68. In 3064, ___ is in the hundreds' place

69. In 6345, ___ is in the thousands' place

70. In 821, ___ is in the tens' place

71. In 1827, ___ is in ones' place

72. In 426,825 , ___is in the ten-thousands' place

NAME_____

MATHEMATICS DIAGNOSTIC - Part II cont'd - PERIOD_____ _____

DATE_____ _____

Comparing Numbers

73. The number halfway between 10 and 20 is ____?

74. One-third of 45 is _____?

75. The number halfway between 240 and 360 is _____?

76. Which number is nearest 56? A) 69 or B) 45 (circle correct an

77. Which number is farthest from 230? A)213 or " " "
B) 244

Understanding Fractions

Make a fraction to go with the picture

78. 79. 80. 81. 82.

Place a circle around the right answer

83. 1/2 is the same as: 1/8, 2/8, 4/8, 6/8

84. 3/4 is the same as: , , 9/15, 8/12

85. 2/5 is the same as: .5, 6/9, 40%,

Find the Missing Number

86. $\frac{2}{3} = \frac{\quad}{15}$ 87. $\frac{18}{30} = \frac{\quad}{10}$ 88. $\frac{3}{4} = \frac{15}{\quad}$ 89. $\frac{35}{49} = \frac{5}{\quad}$

90. $\frac{4}{5} = \frac{\quad}{45}$ 91. $\frac{45}{60} = \frac{\quad}{4}$ 92. $\frac{5}{9} = \frac{25}{\quad}$ 93. $\frac{88}{121} = \frac{8}{\quad}$

Answer this question:

94. The school year is 180 days. If Eddie came only 90 days, what

NAME_____ __ _____

MATHEMATICS
DIAGNOSTIC TEST - Part II
cont'd -

PERIOD_____

DATE_____

Word Problems:

95. If Eddie went to Easy Bargain Center and bought a sweater for $3.50, a sportcoat for $12.75, and some cool shoes for $6.00, how much did Eddie spend all together?

96. Sadie went to the Record Shop on Salina Street and bought some tough sounds for $4.80, and gave the man a $10.00 bill. How much change did she get?

97. If six lemons cost 39¢, how much would two dozen lemons cost?

98. If the distance from Madison St. to Genesee St. is 75 yards and the distance from Walnut Ave. to University Ave. is 195 yards, how far would you walk if you walked <u>all</u> the way around the block?

Genesee St.

Madison St

99. A bike coasting down Madison St. at 15 miles an hour: how long would it take to go 5 miles?

100. On the Thruway the distance from Syracuse to Buffalo is about 125 miles. A car used 7 gallons of gas for this trip. How many miles did he get on a gallon of gas?

101. Ruby bought 2 lbs. of salted nuts at $1.49 a pound and paid for them with a $5.00 bill. How much money should she have received in change?

102. Isaac raked leaves last Saturday for 3 hours, and also walked the neighbor's dog. He was paid 35¢ for walking the dog and 50¢ an hour for raking leaves. How much did he earn that day?

103. Mrs. Johnson, during the [illegible]
quarters. $7.20 for the telephone [illegible]
$3.00 for the dentist and $18.20 for clothes for [illegible]
how much did she spend all together that month?